

What is claimed is:

add a'7

Claims

1 1. A method of inhibiting rejection of a
2 transplanted tissue in a mammal, said method comprising the
3 steps of

4 a) introducing into a cell, either in vivo or
5 ex vivo, DNA encoding an immunosuppressive polypeptide, and

6 b) if step (a) was carried out ex vivo,
7 transplanting said cell into said mammal

8 wherein expression of said polypeptide is
9 regulated by DNA which does not naturally regulate said
10 expression, so that said polypeptide is expressed close
11 enough to said transplanted tissue to inhibit rejection.

1 2. A method of inhibiting rejection of a
2 transplanted tissue in a mammal, said method comprising the
3 steps of

4 a) introducing into a cell, either in vivo or
5 ex vivo, DNA encoding a glycosidase, and

6 b) if step (a) was carried out ex vivo,
7 transplanting said cell into said mammal

8 wherein expression of said glycosidase is
9 regulated by DNA which does not naturally regulate said
10 expression, so that said polypeptide is expressed close
11 enough to said transplanted tissue to inhibit rejection.

1 3. The method of claim 1 or claim 2 wherein said
2 cell is a cell of an allograft.

1 4. The method of claim 1 or claim 2 wherein said
2 cell is a cell of a xenograft.

1 5. A method of inhibiting a destructive autoimmune
2 response in a mammal, said method comprising the steps of
3 a) introducing into a cell, either in vivo or
4 ex vivo, DNA encoding an immunosuppressive polypeptide, and
5 b) if step (a) was carried out ex vivo,
6 transplanting said cell into said mammal
7 wherein expression of said polypeptide is
8 regulated by DNA which does not naturally regulate said
9 expression, so that said polypeptide is expressed close
10 enough to the site of said destructive autoimmune response
11 to inhibit destruction.

1 6. The method of claim 5 wherein said mammal is a
2 mammal with rheumatoid arthritis.

1 7. The method of claim 5 wherein said mammal has
2 diabetes caused by an autoimmune response.

1 8. The mammal of claim 7, wherein said mammal is
2 presymptomatic.

1 9. The method of claim 5 wherein said mammal is a
2 mammal with systemic lupus erythematosus.

1 10. The method of claim 5 wherein said mammal is a
2 mammal with multiple sclerosis.

1 11. The method of claim 1, 2 or claim 5 wherein
2 said DNA encodes IL-10.

1 12. The method of claim 1, 2 or 5 wherein said DNA
2 encodes TGF- β .

1 13. The method of claim 1, 2 or claim 5 wherein
2 said DNA encodes cyclosporine synthetase and said method
3 further comprises administering to said mammal a
4 therapeutically effective amount of a cyclosporine
5 precursor.

1 14. The method of claim 1, 2 or claim 5 wherein
2 expression of said polypeptide is constitutive.

1 15. The method of claim 1, 2 or claim 5 wherein
2 expression of said polypeptide is inducible by a compound
3 that stimulates an immune response.

1 16. The method of claim 1 or claim 5, said DNA
2 further comprising nucleic acids encoding an inducible
3 polypeptide which activates expression of said DNA encoding
4 said immunosuppressive protein, said inducible polypeptide
5 activating said expression in the presence of a non-toxic
6 compound.

1 17. The method of claim 1, 2 or 5 wherein
2 expression of said polypeptide is inducible by a compound
3 which is tissue specific.

1 18. The method of claim 1, 2 or claim 5, said DNA
2 comprising regulatory elements including a synthetic
3 regulatory DNA sequence from at least one of NF-KB, NF-IL-6,
4 IL-6, LRE, AP-1, p91/stat, or the IL-6 response elements.

1 19. The method of claim 1, 2 or claim 5 wherein
2 said introducing of said DNA is *in vivo*.

1 20. The method of claim 1, 2 or claim 5 wherein
2 said introducing of said DNA is *in vitro*.

1 21. The method of claim 1, 2 or 5 wherein said cell
2 is a cell of the heart.

1 22. The method of claim 1, 2 or 5 wherein said cell
2 is a cell of the liver.

1 23. The method of claim 1, 2 or 5 wherein said cell
2 is a cell of the kidney.

1 24. The method of claim 1, 2 or 5 wherein said cell
2 is a cell of the neuronal tissue.

1 25. The method of claim 1, 2 or 5 wherein said cell
2 is a cell of the lung.

1 26. The method of claim 1, 2 or 5 wherein said cell
2 is a cell of the pancreas.

1 27. The method of claim 24 wherein said cell is a
2 cell of the central nervous system.

1 28. The method of claim 1, 2 or 5 wherein said cell
2 is a cell of said mammal.

1 29. The method of claim 1, 2 or 5 wherein said cell
2 is a myoblast.

1 30. The method of claim 1, 2 or 5 wherein said cell
2 is a renal tubular epithelial cell.

31. The method of claim 1, 2 or 5 wherein said
mammal is a human.

1 32. A substantially pure protein characterized in
2 that
3 it is secreted by cloned anergic T-cells,
4 it blocks IL-2 stimulated T-cell proliferation,
5 it has an apparent molecular weight of between
6 10 and 30 kilodaltons,
7 it can be inactivated by heating to 65°C for 15
8 minutes,
9 it blocks IL-4 stimulated T-cell proliferation
10 in vitro,
11 it is non-cytotoxic to T-cells, and
12 it does not inhibit the production of IL-2 by
13 T-cells in vitro.

1 33. A purified nucleic acid encoding the protein of
2 claim 32.

1 34. A method of altering the effect of IL-2 on an
2 IL-2 receptor-bearing cell in a mammal, said method
3 comprising
4 bringing into close proximity with said cell a
5 second cell of said mammal which is transfected with the
6 nucleic acid of claim 33 so that said second cell secretes
7 said protein.

1 35. The method of claim 34, wherein said second
2 cell is a T-cell.

1 36. The method of claim 34, wherein said second
2 cell is an endothelial cell lining a blood vessel.

1 37. The method of claim 34, wherein said second
2 cell is an epithelial cell.

1 38. The method of claim 37, wherein said epithelial
2 cell is of the proximal tubule of the kidney.

1 39. The method of claim 38, wherein said epithelial
2 cell is a gut epithelial cell.

1 40. The method of claim 34, wherein said mammal is
2 a human.

1 41. A method of altering the effect of IL-2 on an
2 IL-2 receptor-bearing cell in a mammal, comprising,
3 transfecting said cell with the nucleic acid of
4 claim 33 so that said cell secretes said protein.

1 42. A method of altering the effect of IL-4 on an
2 IL-4 receptor-bearing cell in a mammal, said method
3 comprising
4 bringing into close proximity with said cell a
5 second cell of said mammal which is transfected with the
6 nucleic acid of claim 33 so that said second cell secretes
7 said protein.

1 43. The method of claim 42, wherein said second cell
2 is a T-cell.

1 44. The method of claim 42, wherein said second cell
2 is an endothelial cell lining a blood vessel.

1 45. The method of claim 42, wherein said second cell
2 is an epithelial cell.

1 46. The method of claim 45, wherein said epithelial
2 cell is of the proximal tubule of the kidney.

1 47. The method of claim 45, wherein said epithelial
2 cell is a gut epithelial cell.

1 48. The method of claim 42, wherein said mammal is
2 a human.

1 49. A method of altering the effect of IL-4 on an
2 IL-4 receptor-bearing cell in a mammal, said method
3 comprising
4 transfecting said cell with the nucleic acid of
5 claim 33 so that said cell expresses said protein.

1 50. A human T-cell clone characterized in that it
2 is anergic;
3 is dependent on recombinant human IL-2 for
4 growth;
5 expresses cell surface CD8;
6 is non-cytolytic; and,
7 expresses VB11 T cell receptor.